

PATENT ABSTRACTS OF JAPAN

(11)Publication number :

10-286493

(43)Date of publication of application : 27. 10. 1998

(51)Int. Cl.

B04C 5/12
B04C 5/081

(21)Application number : 09-110091

(71)Applicant : NITTO KOGYO CO LTD

(22)Date of filing : 14. 04. 1997

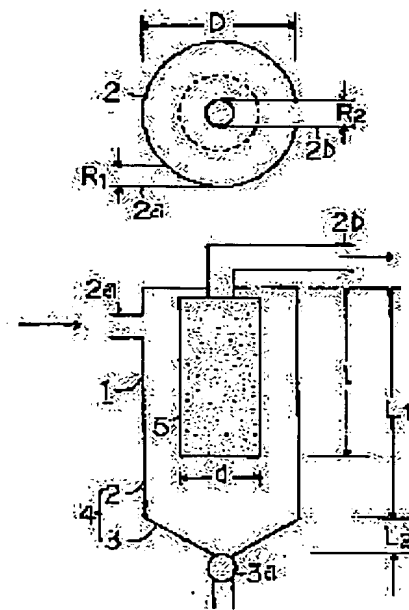
(72)Inventor : NAMITA YASUO
MARUYAMA OSAMU

(54) SEPARATION DEVICE OF PARTICLES IN FLUID

(57)Abstract:

PROBLEM TO BE SOLVED: To enhance the efficiency of separation of particles in a fluid and to maintain the separation performance for a long period, by providing a cylindrical filter in a fluid discharge part inside a cyclone.

SOLUTION: A cyclone 1 is provided with a device 4 consisting of a cylindrical body 2 having an inner diameter of D and $3-3.5D$ length L_1 , and a flat and inverse conical body 3 having length L_2 of $0.2-0.25D$, which is communicated with the body 2 and further provided with an introduction tube 2a having inner diameter R_1 of $0.1-0.2D$, which is provided in the tangent direction of the side part at the upper side of the cylindrical body 2, for introducing particles, a discharge tube 2b having an inner diameter R_2 of $0.1-0.2D$, which is provided in the center of the upper part of the cylindrical body 2 for discharging the fluid in which the particles are separated and a particle takeout part 3a of the separated particles which is provided on the tip part of the flat and inverse conical body 3. Also, a cylindrical filter 5 is provided vertically with a free end whose the tip is opened. The length L of the filter 5 and the inner diameter (d) has a relation to be made as $l=4$ to $5d$, and the size of the cyclone 1 has a relation to be made as $l=0.7$ to $0.75 L_1$ and $d=2D/5$ to $2D/3$.



* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention raises the separation efficiency of the particle in a fluid, and relates to the decollator of the particle in a fluid which enabled it to maintain the engine performance for a long period of time.

[0002]

[Description of the Prior Art] Generally the dust sampler and the filter are used in various industry, such as processing of the dust in waste water treatment, exhaust air processing of a combustion furnace and an incinerator, ceramic industry, a cement industry, cast industry, or food stuff industry. Although there are strengths and weaknesses with the particle size which can be caught, respectively when using such a filter, although the filter is well known as one means to remove the particle in the fluid of a gas or a liquid, all surely cause the performance degradation by blinding. So, it is a technical problem important when using a filter to maintain high prehension effectiveness and to prolong the life. On the other hand, it cannot be said that it has capacity still sufficient about prehension of a particle and a lightweight particle although the field of the above [the cyclone well known as one of the dust samplers / economical efficiency / the separation efficiency] etc. is probably used for the field.

[0003]

[Problem(s) to be Solved by the Invention] As mentioned above, although it is easy to cause the performance degradation by blinding although a filter can catch a particle, and a cyclone, on the other hand, tends to separate a big and rough particle, a problem is in the prehension effectiveness of a particle and a lightweight particle. Moreover, if a cyclone is behind used, using a filter previously when it uses combining both separately, a filter will produce the same problem as the case where the filter of being easy to produce blinding is used independently. If a filter is used behind, using a cyclone previously, a particle inseparable [with a cyclone] In the process in which it is discharged and results in a filter with a fluid, it contacts mutually and condenses. Particle size becomes large or It separates, after adhering to the wall of a path, and it accumulating and becoming a big particle, and it may mix in a fluid. The fluid discharged from the cyclone produces the pressure loss by the circulation way by the time it results in a filter, and the filter which filters such a big particle not only has problems -- it may be easy to start the blinding -- but it has the problem that processing efficiency may be worsened. The 1st purpose of this invention is to offer the decollator of the particle in a fluid which can lengthen the so-called life which can raise the separation efficiency of the particle in a fluid, and can maintain the separability ability for a long period of time. The 2nd purpose of this invention is to offer the decollator of the particle in a fluid which can raise the separation efficiency of a cyclone. The 3rd purpose of this invention can lessen blinding of a filter, and is to offer the decollator of the particle in a fluid which can prolong the life. A filter has the 4th purpose of this invention in offering the decollator of the particle in a fluid which could be made to lessen pressure loss of the fluid circulated and discharged in the inside of a cyclone.

[0004]

[Means for Solving the Problem] This invention offers a decollator of a particle in a fluid which prepared a tubed filter in the fluid discharge section in a cyclone which performs processing which separates a particle contained in (1) and a fluid from this fluid, in order to solve the above-mentioned technical problem. Moreover, a decollator of a particle in a fluid which this invention carried out a tubed filter with which end of one of the two is wide opened by the fluid discharge section in a cyclone which performs processing which separates a particle contained in (2) and a fluid from this fluid at a tip, and prepared the disconnection side, (3) and a cylinder object which has the discharge section of a fluid carried out in processing which separates induction and this particle of a fluid with which a cyclone contains a particle, It has a vessel body which has reverse conoid which takes out a separated this particle which were formed successively by this cylinder object, or a lid of a flat bottom. The above (1) or a decollator of a particle in a fluid of (2) with a fixed bore of this cylinder object, (4) and a tubed filter are cylindrical and relation between length l, a bore d, and the bore D of a cylinder object offers a decollator

of a particle in a fluid of claim 3 which is $3D [d=D / l=d-6d \text{ and } //4 -]/4$.

[0005] It enables it to discharge a fluid used as a cyclone in processing which separates a particle while making it circle in a fluid of a gas containing a particle, or a liquid inside a vessel body, making a particle sediment to a peripheral wall with the centrifugal force, making it descend along with a container wall subsequently and enabling it to discharge from the vessel body lower part from the vessel body upper part in this invention, and a cyclone usually used can be used. Although a configuration of a common vessel body of a cyclone has a cylinder object and reverse conoid formed successively by this, it is desirable at a point that what prepared flat reverse conoid in a pars basilaris ossis occipitalis of a cylinder object of a diameter of the same, and a thing which used the pars basilaris ossis occipitalis as a flat bottom can also enlarge capacity, and does not make excessive a pressure of a fluid from the lower part. A thing of a flat bottom is easy to manufacture and it is desirable also at a point that cost can be reduced. An introductory pipe is formed [a vessel body of a cyclone] in a tangential direction of a cylinder object at the 1 side of the upper part. It is common to form an exhaust pipe in the center of a face-plate moreover, and to prepare the particle fetch section which can take out a particle separated by closing motion of a bulb etc. in a lower limit of reverse conoid. Although a size of these add-on and a size of a volume ratio of a cylinder object and reverse conoid can consider to a standard a configuration generally made desirable and this can be used also in this invention What prepared flat reverse conoid as mentioned above may be used, a thing of a flat bottom may be used, and since a filter is prepared in an exhaust pipe in this invention, the length of an exhaust pipe may be shortened. Any, such as a metal, a metal plating material, and resin, are sufficient as the quality of the material of a vessel body or its accessory.

[0006] Although filters used in this invention are tubed filters, such as a cylindrical filter If end of the one of the two is opened wide, all can be used if the other end is prepared so that a fluid may not leak to the exhaust pipe in the interior of the above-mentioned cyclone, and the open end is carried out at a tip, although it cannot be, pressure loss in the case of an inflow of a fluid Although what closed the open end can be used and it is not restricted especially, relation with the bore D of $l=d-6d$ and a cylinder object has desirable relation between length l and a bore d from speed of a fluid with which it circulates inside of it that it is the cylindrical filter which is $3D [d=D/4 -]/4$, and relation of the prehension nature of a particle. Especially a limit can be chosen also as the quality of the material of a filter at arbitration, such as a winding type which there is not and twisted a nonwoven fabric laminating type, thread, or a string-like material, resin or a ceramic sintering type, a monolayer filter paper, and a pleat filter paper, and an aperture can also choose it as it at arbitration according to the purpose. Material which may use for a filter what generates static electricity with a means of friction by circulation of a fluid or others, and may use together adsorbing a particle with static electricity, and has adhesiveness is made to contain, you may use together catching a particle according to the adhesion, and a particle adhesion means of these or others may use it combining independent or plurality. In order to prepare this filter in an exhaust pipe, a method of others which fix an end side of a tubed filter to an exhaust pipe side, and use an open end side by the side of the other end or lock out one end as the free end, or are not used as the free end may be used, but when all have an open end, a fluid just flows from tips, such as that open end. As the way of preparing, an end plate which ****s in the center and has a hole is formed in a both-ends or end side of a tubed filter of end disconnection. A method of thrusting for the ability preparing a thread part also in an exhaust pipe, a method of pressing an exhaust pipe fit for making a screw-thread hole of the end plate the usual through tube, A method of pressing by spring which inserted both ends or a tubed filter of end disconnection in an exhaust pipe, and supported the edge from the opposite side to the vessel body in contact with the upper surface of a vessel body of a cyclone etc. is mentioned.

[0007]

[Embodiment of the Invention] As shown in drawing 1 , 1 is a cyclone, a bore D is fixed, and it is length $L1$. The cylinder object 2 of $3D - 3.5D$, Length $L2$ formed successively by this It has the vessel body 4 which consists of flat reverse conoid 3 of $0.2-0.25$. Bore $R1$ which introduces the fluid containing the particle furthermore prepared in the tangential direction of the flank of the upper part of the cylinder object 2 Introductory pipe 2a of $0.1-0.2D$, Bore $R2$ which discharges the fluid carried out in the processing which separates the particle prepared in the center of the upper part of the cylinder object 2 It has exhaust pipe 2b of $0.1-0.2D$, and particle fetch section 3a of the separated particle which was prepared in the point of the flat reverse conoid 3. Moreover, 5 is the tubed filter prepared in the cyclone 1, and it is formed in the shape of a cylinder, the tip is opened wide, and it is prepared in the perpendicular of the free end. Length l of a filter and a bore d are made $l=4d-5d$ relation, and consider the size of the above-mentioned cyclone as the relation of $l=0.7$ to $0.75L1$, and $d=2D/5-2D/3$. If the fluid which contains a particle in such a configuration is introduced from introductory pipe 2a, a particle and a fluid will flow into the cylinder object 2 by the hydrostatic pressure in the tangential direction, and in accordance with the wall, circle caudad one by one, a bigger particle is made to collide with the wall in the process by centrifugal operation, it dissociates from a fluid, this is performed one by one from the bottom, and many are separated for a bigger

particle. The fluid which dissociates and contains the particle which does not go out flows from the open end side of a filter 5, circulates the interior, and is discharged from exhaust pipe 2b. Although a filter 5 mainly separates [the process] a particle by the inside, in the portion in contact with the fluid which circulates on the outside, a particle is mainly separated also from the fluid. Thus, although the fluid carried out in separation processing of a particle is obtained from discharge section 2b, since the separated particle collects on reverse cone-like section 3a, it can be taken out from particle fetch section 3a by actuation of open clausilium etc. Under the present circumstances, since a cylinder object is a diameter of fixed and the flat conoid is only ten or less percent of the length of a cylinder object when it is made the size of the above cyclones, capacity of a vessel body 4 can be enlarged, a throughput is increased so much, and since it can avoid making excessive the pressure of the fluid which moreover flows into a filter and it can be made moderate, the prehension nature of the particle from that fluid can be improved. Moreover, it can be located in the good place where the particles contained in the fluid which circles in a cyclone gather for a central site if a filter is made into the above-mentioned size. If do not contact a big particle, but it is [blinding] lifting-hard, and it is made, the ratio of the path, the ratio of length and its path, and the bore of a cylinder object can make prehension effectiveness of a particle suitable in connection with the velocity of circulation of a fluid and a tip is used as an open end, the inflow of a fluid will be made easy and pressure loss can be lessened. In addition, as shown in drawing 2 which shows the same component, the lid 6 which ****s in a flat bottom and can make attachment and detachment free by a stop etc. is sufficient as the same sign as drawing 1, and it is desirable in respect of the ease of manufacture, and cost reduction. [of the flat reverse conoid 3] Moreover, if the tubed filter 5 is compared when filtering the fluid discharged from a cyclone even in this case in that tip although the magnitude of pore may be changed by the same material and the same others in closing and that case, it can abolish the pressure loss in the circulation way which results in the filter of that exterior, and can improve processing efficiency so much.

[0008]

[Example] Next, the example of this invention is explained.

In the D= 130mm L 1 = 400mm R 2 = 15mm cyclone 1 shown in example 1 drawing 1 [L 2 = 30mm] [R 1 = 15mm] the nonwoven fabric (polyester --) of a monolayer (l= 300mm as a tubed filter 5, and d= 65mm) The cylindrical filter which twisted 500micro in 50micro of apertures and thickness around the reinforcement cylinder of a mesh is attached by thrusting the end plate which was attached in the end and which ****s and has a hole into the thread part prepared in the above-mentioned exhaust pipe 2b. In addition, in order to attach a filter, the upper surface board of a cylinder object can be suitably formed free [attachment and detachment] with a sealing means, or the reverse conoid can be suitably prepared free [attachment and detachment] with a sealing means, and it can attach in the condition of having demounted. In this condition, they are the dusts and aerosols for industrial testing (what mixed eight sorts (particle of a Kanto loam layer) of JIS Z8901 dusts and aerosols for industrial testing was introduced in the cylinder object 2 from introductory pipe 2a by the 0.38m [/second] rate of flow, and it processed within the vessel body 4, and was made to discharge from exhaust pipe 2b) of the particle size distribution of 0.5% of the following table 1 to tap water as a fluid. After starting the installation, the sample of 1000 cc of fluids discharged from exhaust pipe 2b as of 10 minutes was extracted, and residual particle weight was calculated by filtering by 0.1micro membrane. Consequently, "the dust prehension effectiveness (%)" which "the amount of dust prehension for 10 minutes (g)" is 166g, and is the rate to the amount of particle installation for 10 minutes was 83%. Moreover, when the sample was extracted and it asked for the differential pressure of the rate of flow at the time of discharge of exhaust pipe 2b, and the fluid pressure at the time of the above-mentioned installation and its discharge from each rate of flow (current meter), it is the same as the rate of flow of the time of fluid discharge, and differential pressure (0.1 kg/cm²), and was changeless. From this, continuation use is possible for a filter with a natural thing. In addition, the result with the same component almost same also about the equipment of drawing 2 made into the same size as the above was obtained.

[0009]

[A table 1]

粒子径	ふるい上%
5	61 ± 5
10	43 ± 3
20	27 ± 3
30	15 ± 3
40	9 ± 3
74	3以下

[0010] It sets in the example of comparison 1 example 1, and is a cylinder object made from steel (the bore of 65mm) instead of the above-mentioned filter. Although the differential pressure with the pressure of the rate of flow at the time of the discharge from exhaust pipe 2b at the time of sample extraction and the fluid at the time of the installation was not different from the beginning when similarly examined except having attached what formed the end plate which ****s at the end with a length of 100mm and has a hole like exhaust pipe 2b, and having used it "The amount of dust prehension for 10 minutes (g)" was 108g, and "dust prehension effectiveness" was 54%. This can also be substantially considered as the case where a filter is not used together.

[0011] What was closed instead of the above-mentioned filter in example of comparison 2 example 1 with the nonwoven fabric which used the free end of the filter for the filter is attached like exhaust pipe 2b. The place which performed ***** similarly except attaching introductory pipe 2a furthermore so that it may go to the main lower part of the cylinder object 2, and having made it a fluid flow in a perpendicular lower part to a cylinder object, Since the pressure of the fluid discharged from exhaust pipe 2b decreased rapidly and the differential pressure with the pressure at the time of installation went up rapidly, the trial was suspended in 90 seconds. Although the amount of dust prehension in this time was 28.5g and "dust prehension effectiveness" was 95%, it was judged that the use which blinding continues violently was impossible for a filter. It can also be said that it is in charge of this having not used a cyclone but having used only the filter substantially.

[0012] The result of the above example 1 and the examples 1 and 2 of a comparison is shown in a table 2. Among the table, the filter continued and the life showed "O" and an impossible thing for the usable thing as "x."

According to this table, an example 1 compares both dust prehension effectiveness and a life well, and, as for the example 1 of a comparison, short ** past ***** understands [dust prehension effectiveness] a life for past [wrong] and the example 2 of a comparison. In addition, the equipment of this invention can also be used as "the defecation equipment of a particle content fluid", and this invention can also be considered as "the separation method of the particle in a fluid", and the "defecation method of a fluid of separating the particle in a fluid." Moreover, in the case of which, it is good also considering a "particle" as an "impurity particle", and, in any case, limitation of a "solid particulate" may be further added to a "particle."

[0013]

[A table 2]

	ダスト捕集効率 (%)	10分間でのダスト捕集量(g)	寿命
実施例1	83	166	○
比較例1	54	108	○
比較例2	95	28.5 (90秒間)	×

[0014]

[Effect of the Invention] Since the tubed filter was prepared in the cyclone, if according to this invention the separation efficiency of the particle in a fluid is especially raised and the end of one of the two of the filter is used as an open end Since the filter can lessen pressure loss of the fluid circulated and discharged in the inside of a cyclone If the decollator of the particle in a fluid which can lengthen the so-called life which maintains the separability ability for a long period of time can be offered and this is seen from a cyclone side If the separation efficiency of a cyclone can be raised and it sees from an another side and filter side If the life can be prolonged and this moreover sees from a filter side combining a place with both sufficient equipments by the ability lessening blinding of a filter, in the state of an as much as possible particle A particle can be caught on the so-called upper part of a river, and there can also be little pressure loss of a fluid, can combine the engine performance in the condition that the maximum exertion can be carried out, and can offer the decollator of the particle in a fluid which does not have ** for each other in the place where both are bad. Moreover, if a cylinder object is made into the same bore, it can avoid making excessive speed of the fluid from the lower part, and the speed of a fluid and the relation of prehension of the particle in the fluid can be kept suitable with limitation of the relation between the length of a filter, its bore, and the bore of a cylinder object.

[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] A decollator of a particle in a fluid which prepared a tubed filter in the fluid discharge section in a cyclone which performs processing which separates a particle contained in a fluid from this fluid.

[Claim 2] A decollator of a particle in a fluid which carried out the disconnection side at a tip, and prepared a tubed filter with which end of one of the two is wide opened by the fluid discharge section in a cyclone which performs processing which separates a particle contained in a fluid from this fluid.

[Claim 3] A cyclone is equipped with a vessel body which has a cylinder object which has the discharge section of a fluid carried out in processing which separates induction and this particle of a fluid containing a particle, and flat reverse conoid which takes out a separated this particle which were formed successively by this cylinder object or a lid of a flat bottom, and is the decollator of a particle in a fluid according to claim 1 or 2 with a fixed bore of this cylinder object.

[Claim 4] It is the decollator of a particle in a fluid according to claim 3 whose relation between length l , a bore d , and a bore D of a cylinder object a tubed filter is cylindrical and is $3D [d=D / l=d-6d \text{ and } //4 -]/4$.

[Translation done.]

*** NOTICES ***

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the cross-section transverse plane and upper surface mimetic diagram showing the decollator of the particle in a fluid of one example of this invention.

[Drawing 2] It is the cross-section transverse plane and upper surface mimetic diagram showing the decollator of the particle in a fluid of other examples of this invention.

[Brief Description of Notations]

- 1 Cyclone
- 2 Cylinder Object
- 2a An introductory pipe
- 2b Exhaust pipe
- 3 Flat Reverse Conoid
- 3a Particle fetch section
- 4 Vessel Body
- 5 Tubed Filter

[Translation done.]

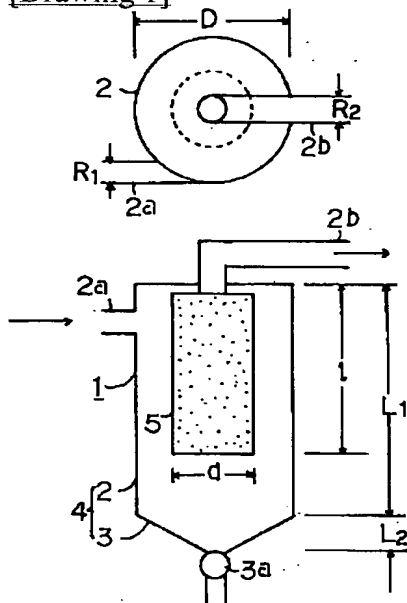
* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

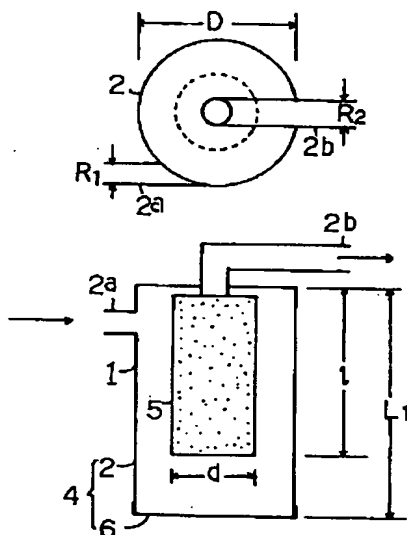
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]



[Drawing 2]



[Translation done.]

🔍 Title: **JP10286493A2: SEPARATION DEVICE OF PARTICLES IN FLUID**

🔍 Derwent Title: Fine particle separation apparatus for fluid - has cylindrical filter, arranged on fluid discharge side of cyclonic particle separator
[\[Derwent Record\]](#)

🔍 Country: **JP Japan**

🔍 Kind: **A**

🔍 Inventor: **NAMITA YASUO;
MARUYAMA OSAMU;**

🔍 Assignee: **NITTO KOGYO CO LTD**
[News, Profiles, Stocks and More about this company](#)

🔍 Published / Filed: **1998-10-27 / 1997-04-14**

🔍 Application Number: **JP1997000110091**

🔍 IPC Code: **B04C 5/12; B04C 5/081;**

🔍 Priority Number: **1997-04-14 JP1997000110091**

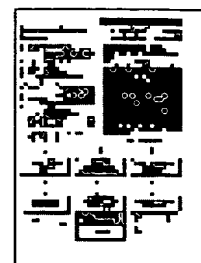
🔍 Abstract: **PROBLEM TO BE SOLVED:** To enhance the efficiency of separation of particles in a fluid and to maintain the separation performance for a long period, by providing a cylindrical filter in a fluid discharge part inside a cyclone.

SOLUTION: A cyclone 1 is provided with a device 4 consisting of a cylindrical body 2 having an inner diameter of D and $3-3.5D$ length L_1 , and a flat and inverse conical body 3 having length L_2 of $0.2-0.25D$, which is communicated with the body 2 and further provided with an introduction tube 2a having inner diameter R_1 of $0.1-0.2D$, which is provided in the tangent direction of the side part at the upper side of the cylindrical body 2, for introducing particles, a discharge tube 2b having an inner diameter R_2 of $0.1-0.2D$, which is provided in the center of the upper part of the cylindrical body 2 for discharging the fluid in which the particles are separated and a particle takeout part 3a of the separated particles which is provided on the tip part of the flat and inverse conical body 3. Also, a cylindrical filter 5 is provided vertically with a free end whose the tip is opened. The length L of the filter 5 and the inner diameter (d) has a relation to be made as $L=4$ to $5d$, and the size of the cyclone 1 has a relation to be made as $L=0.7$ to $0.75 L_1$ and $d=2D/5$ to $2D/3$.

COPYRIGHT: (C)1998,JPO

🔍 Family: **None**

🔍 Other Abstract Info: **DERABS G99-017344 DERG99-017344**



[View Image](#)

1 page